

# Research in Biogeosciences 2003 (BioGeo)

## Exploring the Interface between Geology and Biology: Opportunities in Geomicrobial Processes

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### *Program Announcement*

***NSF 02-172***

DIRECTORATE FOR GEOSCIENCES  
DIVISION OF ATMOSPHERIC SCIENCES  
DIVISION OF EARTH SCIENCES  
DIVISION OF OCEAN SCIENCES

**FULL PROPOSAL DEADLINE(S): December 6, 2002 by 5:00 P.M. local time.**



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# SUMMARY OF PROGRAM REQUIREMENTS

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## GENERAL INFORMATION

**Program Title:** Research in Biogeosciences 2003 (BioGeo)

**Synopsis of Program:** This is the first announcement in the new Biogeosciences Program of the Directorate for Geosciences and will focus this year on microbial processes in two topical elements. Topic one emphasizes understanding microbial processes affecting geological materials: microbial strategies in environments unique to microbial life, interpreting current microbial interactions with geologic media, identifying past records of such interactions, understanding microbial adaptations to current geologic alterations and deciphering the record of such adaptations in the past. The second focus, on methods for study of geomicrobial processes includes: model systems, geochemical methods and nanoscale investigations.

### **Cognizant Program Officer(s):**

- Rachael Craig, Biogeosciences and Carbon Cycle, Program Director, Directorate for Geosciences, 785 S, telephone: 703-292-8233, e-mail: [rcraig@nsf.gov](mailto:rcraig@nsf.gov).
- Phillip Taylor, Biological Oceanography, Program Director, Geosciences, Ocean Sciences, 725 N, telephone: 703-292-8582, e-mail: [prtaylor@nsf.gov](mailto:prtaylor@nsf.gov).
- David Verardo, Paleoclimate Program, Program Director, Geosciences, Atmospheric Sciences, 775 S, telephone: 703-292-8527, e-mail: [dverardo@nsf.gov](mailto:dverardo@nsf.gov).
- Enriqueta Barrera, Geology and Paleontology, Program Director, Geosciences, Earth Sciences, 785 S, telephone: 703-292-8551, e-mail: [ebarrera@nsf.gov](mailto:ebarrera@nsf.gov).

### **Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):**

- 47.050 --- Geosciences

## ELIGIBILITY INFORMATION

- **Organization Limit:** None
- **PI Eligibility Limit:** Proposals that are submitted to this Announcement of Opportunity and are either previously or subsequently submitted in a substantially similar form to another NSF Program or special announcement, will be returned without completion of the review.
- **Limit on Number of Proposals:** None

## AWARD INFORMATION

- **Anticipated Type of Award:** Standard Grant
- **Estimated Number of Awards:** Approximately 10 awards, averaging \$100,000 per year for up to five years each are anticipated.
- **Anticipated Funding Amount:** Approximately \$5 million (total for all awards) pending the availability of funds and depending on the quality of proposals received.

# PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

## *A. Proposal Preparation Instructions*

- **Full Proposals:** Supplemental Preparation Guidelines
  - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

## *B. Budgetary Information*

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full program announcement/solicitation for further information.

## *C. Deadline/Target Dates*

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** December 6, 2002 by 5:00 P.M. local time.

## *D. FastLane Requirements*

- **FastLane Submission:** Required
- **FastLane Contact(s):**
  - Brian Dawson, Information Technology Specialist, GEO/OAD, Directorate for Geosciences, 705 N, telephone: 703-292-4727, e-mail: [bdawson@nsf.gov](mailto:bdawson@nsf.gov).

## PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

## AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

## **I. INTRODUCTION**

The NSF Directorate for Geosciences announces a new competition in FY2003 in support of fundamental research in the biogeosciences. This solicitation recognizes the extraordinary growth of inquiry that has occurred at the interface of the biological and geological sciences, as well as the intellectually stimulating and challenging frontiers that lie ahead. The biogeosciences explore how organisms influence and are influenced by the Earth's environment. The emergence of this field is characterized by conceptual and technological advances opening new avenues of research and the development of shared methods, paradigms and vocabulary that are bridging disciplinary differences.

As part of the Directorate for Geoscience's fundamental goal "...to advance the scientific understanding of the integrated Earth systems through supporting high quality research..." (NSF Geosciences Beyond 2000", NSF 00-27; <http://www.geo.nsf.gov/adgeo/geo2000.htm>) this is one of a series of focused announcements of opportunity anticipated over the next several years to more fully develop research in the biogeosciences. This initiative evolves from a wealth of recent planning between the Directorate and the scientific community, as well as from planning activities within the Divisions of Earth, Ocean and Atmospheric Sciences.

Geomicrobial processes lie at the heart of the Biogeoscience competition for FY 2003. "Basic Research Opportunities in the Earth Sciences" (2001, National Research Council) points to the crucial role microbes play at the interface of biological and geological processes both in its "Critical Zone" and "Geobiology" themes. "Geobiology: Exploring the Interface Between the Biosphere and the Geosphere" (2001, American Academy of Microbiology) focuses primarily on geomicrobiology; and "Geobiology: Current Technology and Resources Needs" (2001, Agouron Institute) summarizes some of the current research taking place in geobiology, and outlines the resources that are needed to advance this discipline. Fundamental questions relevant to the origin and evolution of life in deep-sea ecosystems derive from the emerging understanding that "microbes are the biogeochemical engines that power the ecology of vent systems" (Ridge 2000 Science Plan: Planetary Renewal and Life in the Deep Ocean).

The Directorate for Geosciences invites the U.S. scientific community to submit proposals to conduct innovative research into fundamental geomicrobial processes, which constitute the foundation of the biogeosciences. For the purposes of this competition microbes include: viruses, Eubacteria, Archaea and unicellular Eukarya.

## **II. PROGRAM DESCRIPTION**

Microbial communities exist within a broad spectrum of environmental conditions including those found at the Earth's surface, deep in the crust, in freshwater environments and within the oceans and possibly the atmosphere. They are involved in a broad array of geological and biological processes involving the evolution of the Earth and its biocomplexity, ecology, geochemical cycling, biomineralization, mineral ore formation, lithification and energy production. Geoscientists and bioscientists alike have discovered that microorganisms influence the Earth's environment through an astonishing array of chemical processes. Indeed, at lower temperatures and with geological time thermodynamic processes may be less important than kinetic processes mediated by microbes. The presence of certain trace gases in the atmosphere, the acidification of mine-waste waters, and metal distributions in soils and sediments are all products of these micro-scale chemical reactors. Despite their importance and omnipresence, more than 99% of microbes on Earth remain uncharacterized, many from unique or incompletely explored environments. This demonstrates the need for collaboration among biologists and geologists in the examination of microbial communities and their roles in Earth processes and history

Proposers should seek: to increase our understanding of processes at the microbe-mineral interface within moderate or extreme environments; to elucidate the deep geologic record of microbial activity and the co-evolution of the geosphere and biosphere; or to better understand the impact of microbes on biogeochemical processes

The science directions suitable for consideration in this solicitation are outlined below in the form of questions within each of two focal areas (processes and techniques).

Focus I. Understanding microbial processes and conditions that result in the formation and alteration of geological structures (i.e. minerals, rocks, soils). This announcement solicits proposals for fundamental research on any of the following questions:

- What novel strategies to derive energy and nutrients, or to adjust metabolism are employed by microorganisms (as individuals, populations, or consortia) in environments where other major life forms are not known to exist?
- What are the signatures of present-day microbial presence and process on or in rocks and minerals?
- On what basis do we identify microbes, microbial associations and microbial metabolisms that have existed in the past?
- By what strategies (e.g. ecological succession, consortia) do microbes and microbial communities adjust during the geological alterations of minerals and rocks and what are the geochemical requirements in the environment for such adjustments?
- What environmental forcings and responses are related to changes in microbes, geomicrobial associations and geomicrobiological processes over geological time?

Focus II. Developing new research techniques. New techniques are helping to address questions generated at the intersection of biology and geology. Many of these techniques have been commonly used within the disciplines of bio- or geosciences, but are now impacting observations in the interdisciplinary area. Further research is solicited to expand the utility of these techniques in studying geomicrobial activity in the following areas:

- What model systems (e.g. cultured communities) can help individual investigators or the research community address critical geomicrobiological questions in laboratory and/or field settings?
- What biogeochemical methods (e.g. analysis of organic matter, trapped gases, fossils, isotopes) can assist our delineation of geomicrobial activity?
- How can three-dimensional perspectives of nanoscale mineral and microbe structures and forces help to better understand geomicrobial processes?

### **III. ELIGIBILITY INFORMATION**

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

## IV. AWARD INFORMATION

Approximately \$5 million is available for proposals selected for funding (total for all awards) pending the availability of funds and depending on the quality of proposals received. Approximately 10 awards, averaging \$100,000 per year for up to five years each are anticipated.

Estimated award amount, number of awards and average award size/duration are subject to the availability of funds. These estimates are offered as guides to interested researchers and are not intended to direct the details of budgets or timelines.

Projects suitable for this announcement include proof of concept studies, small-scale pilot studies, single-or multiple-investigator projects or large interdisciplinary research projects. Projects can be proposed for up to five years duration.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

### A. Proposal Preparation Instructions

#### Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

Protocols for safety and security - Proposals that work directly with microbes retrieved from extreme environments are expected to address appropriate safety and security issues (isolation, ultraclean facilities, decontamination and access) in the research and management plans. Investigators are expected to follow appropriate guidelines established for the Microbial Observatories announcement (<http://www.nsf.gov/pubs/2002/nsf02118/nsf02118.txt>).

Ship time - Proposals may require the scheduling of NSF-UNOLS ship time. These proposals must include a completed NSF-UNOLS Request Form (NSF Form 831). The UNOLS form may be obtained from the NSF Division of Ocean Sciences Ship Operations Program, National Science Foundation by calling (703) 292-8581, or directly from the UNOLS World Wide Web site at <http://www.unols.org>.

Proposers are reminded to identify the program solicitation number (NSF 02-172) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

### B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Announcement.

**Other Budgetary Limitations:** Major Equipment - major equipment purchases will not be supported under this Program Announcement.

## C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

**Full Proposals by 5:00 PM local time:** December 6, 2002

## D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Announcement through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this Program Announcement should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

*Submission of Electronically Signed Cover Sheets.* The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see [Chapter II, Section C](#) of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

## VI. PROPOSAL REVIEW INFORMATION

### A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

#### **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

**What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

**Additional Review Criteria**

Proposals that are submitted to this Announcement of Opportunity and are either previously or subsequently submitted in a substantially similar form to another NSF Program or special announcement, will be returned without completion of the review.

**B. Review Protocol and Associated Customer Service Standard**

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail Review followed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the identities of reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In most cases, proposers will be contacted by the Program Officer after his or her recommendation to award or decline funding has been approved by the Division Director. This informal notification is not a guarantee of an eventual award.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at one's own risk.

## **VII. AWARD ADMINISTRATION INFORMATION**

### **A. Notification of the Award**

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

### **B. Award Conditions**

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)\* or Federal Demonstration Partnership (FDP) Terms and Conditions,\* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

\*These documents may be accessed electronically on NSF's Web site at [http://www.nsf.gov/home/grants/grants\\_gac.htm](http://www.nsf.gov/home/grants/grants_gac.htm). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

### **C. Reporting Requirements**

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

## VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Research in Biogeosciences 2003 should be made to:

- Rachael Craig, Biogeosciences and Carbon Cycle, Program Director, Directorate for Geosciences, 785 S, telephone: 703-292-8233, e-mail: [rcraig@nsf.gov](mailto:rcraig@nsf.gov).
- Phillip Taylor, Biological Oceanography, Program Director, Geosciences, Ocean Sciences, 725 N, telephone: 703-292-8582, e-mail: [prtaylor@nsf.gov](mailto:prtaylor@nsf.gov).
- David Verardo, Paleoclimate Program, Program Director, Geosciences, Atmospheric Sciences, 775 S, telephone: 703-292-8527, e-mail: [dverardo@nsf.gov](mailto:dverardo@nsf.gov).
- Enriqueta Barrera, Geology and Paleontology, Program Director, Geosciences, Earth Sciences, 785 S, telephone: 703-292-8551, e-mail: [ebarrera@nsf.gov](mailto:ebarrera@nsf.gov).

For questions related to the use of FastLane, contact:

- Brian Dawson, Information Technology Specialist, GEO/OAD, Directorate for Geosciences, 705 N, telephone: 703-292-4727, e-mail: [bdawson@nsf.gov](mailto:bdawson@nsf.gov).

## IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF [E-Bulletin](#), which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations.

Subscribers can also sign up for NSF's [Custom News Service](#) (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

Because of the variety of programs within NSF that offer support for microbe-related research it is important for researchers to understand that this program is focused on projects that directly examine the geo-bio interface. A broad range of programs within and across many directorates of NSF support research on microbes. The most relevant are listed below. Investigators are encouraged to contact appropriate program officers to determine which program, initiative or special focus solicitation is most appropriate as a funding source to avoid inappropriate proposals and to expedite the proposal-writing and review process.

Biocomplexity and the Environment (BE) [http://www.geo.nsf.gov/ere/ere\\_be-competitions.html](http://www.geo.nsf.gov/ere/ere_be-competitions.html), particularly the Coupled Biogeochemical Cycles (CBC) activity <http://www.nsf.gov/pubs/2002/nsf02010/nsf02010.html#cbc> includes some support of microbial research as an NSF-wide initiative.

The Biological Sciences Directorate (<http://www.nsf.gov/bio>), Division of Environmental Biology supports microbial research within these programs: Biotic Surveys & Inventories; Ecology; Ecosystem Studies; and Population Biology. The Division of Molecular and Cellular Biosciences (MCB) supports microbial studies through the Microbial Genetics; and Microbial Observatories programs.

Within the Engineering Directorate (ENG), the Division of Bioengineering and Environmental Systems (BES) has a program in Environmental Engineering and Technology that considers proposals related to microbes [http://www.eng.nsf.gov/bes/Programs/Environmental\\_Engineering\\_Basi/environmental\\_engineering\\_basi.htm](http://www.eng.nsf.gov/bes/Programs/Environmental_Engineering_Basi/environmental_engineering_basi.htm).

The Directorate for Geosciences (<http://www.geo.nsf.gov>) supports microbe-related research through participation in the BE initiative, specifically CBC and Water Cycle Research. Other programs within each Division support microbe-related research including programs and special foci in the Ocean Sciences Division: Biological Oceanography; Chemical Oceanography; Marine Geology and Geophysics (MGG); the Ocean Drilling Program (ODP); and several within the Earth Sciences Division (Hydrologic Sciences; Geology and Paleontology) and the Atmospheric Sciences Division including the Biogeosciences Initiative at the National Center for Atmospheric Research.

The Directorate for Geosciences participates in the federal effort in microbial science coordinated through the Microbe Project Interagency Working Group (MPIWG).

## **ABOUT THE NATIONAL SCIENCE FOUNDATION**

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at [plainlanguage@nsf.gov](mailto:plainlanguage@nsf.gov).

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

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